Product Update
SKYWAN 5G SW Release V1.6

All information provided here is subject to change without notice. Contact your sales representative to obtain the latest product specifications and roadmaps.
Lead

ND SATCOM's VSAT flagship product SKYWAN 5G is continuously enhanced with new features. Some version history and the feature set is outlined in the table below and further explained in this document:

<table>
<thead>
<tr>
<th>SW</th>
<th>Release Date</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4.99</td>
<td>2018-04-27</td>
<td>Header Compression, Multi-Master, OpenAMIP antenna interface, outdoor housing, Encryption board, NMS redundancy, NMS Northbound interface, Multi-Language WebUI</td>
</tr>
<tr>
<td>1.5.113</td>
<td>2018-11-30</td>
<td>COTM optimization, Beam Switching, NMS: Topology based routing, DHCP service, Load Balancing upgrade for redundant setups, Encryption Key exchange, DVB based pointing, DVB VRF assignment, NMS: reports, NMS: DVB and large icons, NMS: collect/compress logs</td>
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<tr>
<td>1.6.138</td>
<td>2019-12-12</td>
<td>see following sections</td>
</tr>
</tbody>
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The ONE- Building Block

SKYWAN 5G - THE ONE Mastermind - is the building block and core product of ND SATCOM's VSAT offerings. It comes either as 19” rack version or as board for integration in terminals powered by SKYWAN 5G or as outdoor version.

The units can be interconnected to increase inbound capacity (utilize multiple receive channels aka stacking), for hot-standby backup (1+1 / N+M node redundancy) or as part of the DVB-S2X solution.

Examples for integrated terminals based on the SKYWAN 5G mini board are ultralightweight manpack terminals.

Verticals

SKYWAN 5G is the platform of choice for mission and business critical applications in a cost-effective way. A few examples are shown below.

**Air Traffic Control**

**News**

**On-The-Pause**

**On-The-Move**

**SMART Mobile² Networks**

SMART MOBILE² NETWORKS provide efficient, secure and reliable connectivity anywhere and meets the requirements of Mission Critical Push To Talk applications (max 300ms delay).

**Maritime**

Powered By

**SKYWAN 5G**
SKYWAN 5G Release V1.6

In the scope of the SKYWAN 5G development cycle release V1.6 numerous software and hardware features were implemented as described in the following.

SKYWAN 5G-SR

SKYWAN 5G-SR sets the new 19” standard rack unit coming with SMA-connectors for the RF interfaces and an additional dedicated 10 MHz reference signal port.

The SMA-connectors are more robust, have better RF performance and ease cabling in complex setups based on a broader range of available components.

The additional reference clock port delivers more output power (minimum +8 dBm) and the signal is always-on.

Note: L-Band cabling with SMA/N technology has 50 Ω impedance while the F-cabling operates on 75 Ω impedance.

SKYWAN 5G R1.6 supports both 19” rack variants.

OLED Front Display

The OLED technology offers a higher contrast and brightness, fuller viewing angle and faster refresh rates compared to LCD technology. The OLED display is introduced in series production for the models:

• SKYWAN 5G
• SKYWAN 5G-SR
• SKYWAN 5G OUTDOOR

DVB-S2/S2X Gateway AT-60

The Work Microwave AT-60 sets the new standard DVB Gateway of the SKYWAN 5G DVB solution. The unit comes with an ND SATCOM license enabling solution specific value add functions (ACM signalling, openTMP support with registration and terminal authentication).

The DVB Gateway AT-60 integration comprises service provisioning, operation and monitoring. The SKYWAN 5G NMS offers an easy to use point & click web user interface for DVB service provisioning. The configuration is transferred to the SKYWAN 5G node controller located next to the DVB Gateway for configuration and management using the dedicated system VLAN. The SKYWAN 5G node controller monitors also the operational status of the DVB Gateway and reports it to the SKYWAN 5G NMS for display in the status area and DVB dashboard.

Existing networks benefit from the new DVB-S2X gateway AT-60 by:

• Form/fit/function compatible
• Strict enforcement of throughput policies
• Enhanced redundancy in hot-standby mode up to four AT-60 devices

ACM for TDMA

Adaptive Coding and Modulation (ACM) known from DVB-S2 outbound is implemented in the MF-TDMA channel access method and available for initial services in controlled environments. Selected customers interested in this disruptive feature can take part in field trials now.

General availability of ACM for TDMA for all customers follows in the course of the next months once this pioneering innovation is fully validated by early adopting customers to meet the high quality and robustness our TDMA access scheme stands for.

ACM enables each station to achieve maximum data throughput by utilizing the most efficient modulation and coding scheme (MODCOD) dependant upon the location within the satellite footprint, antenna size and local weather condition.

Adaptive Coding and Modulation: TDMA link speed adaptation for inbound and outbound

Note: ACM selects the most efficient MODCOD for inbound and outbound for any-to-any communication.

ACM for DVB-S2 manages DVB-S2 outbound link only. However, ACM for TDMA supports star and mesh topologies on outbound and inbound direction. ACM for TDMA selects the
MODCODs per remote station depending on dynamically measured link quality per TDMA bursts. ACM for TDMA extends the control range of existing Transmit Power Control and handles higher Es/No fluctuation by reacting on signal quality. The range of MODCODs usable with ACM for TDMA covers all non-COTM waveform MODCODs (QPSK 1/3 ... 16APSK 6/7).

ACM for TDMA controls individually configurable MODCODs per station sharing a single TDMA channel. As a consequence, on one TDMA channel stations may send bursts with different MODCODs depending on the receivers actual receive signal quality.

NMS WebUI parameters configure the ACM for TDMA capability. The operator is able to activate ACM for TDMA on a per station basis with up to 8 MODCODs used per each TDMA channel.

Since ACM for TDMA (depending on link signal quality) may throttle data throughput down to the assured bandwidth, enhancements to the QoS handling are added to provide configuration parameters marking highest priority real-time traffic that shall not be dropped in case a stronger MODCOD resulting in less channel data rate becomes active.

Each station design (e.g. antenna and/or BUC size or achievable min./mean/max. throughput) will benefit from ACM for TDMA and not impact other stations. With new QoS parameters, most critical traffic can be marked to ensure mission critical applications are not throttled.

**Pure Data Channels for TDMA**

The SKYWAN 5G MF-TDMA channel access method uses in-band signalling based on request and reference slots for effective resource management (i.e. request/assign/release bandwidth). For certain topologies, where the signalling can be saved, a TDMA channel is configurable without request and reference slots:

- Channels exclusively used for data communication, more efficient setups with secondary channels
- Intra-spot communication for remotes without loopback

**NMS: Multiple Networks Management**

The SKYWAN 5G NMS supports now up to 60 VSAT networks based on a common pool of 250 nodes in the device inventory. Each TDMA network is managed independently. The IP layer configuration (VRF services) of all networks is independent and will even support same IP addresses in different networks. Each TDMA network can be active or inactive. Each SKYWAN 5G terminal can be assigned to multiple inactive networks. Each TDMA network can be active or inactive. Each SKYWAN 5G terminal can be assigned to multiple inactive networks. The IP layer configuration (VRF services) of all networks is independent and will even support same IP addresses in different networks. Each TDMA network can be active or inactive. Each SKYWAN 5G terminal can be assigned to multiple inactive networks. Each TDMA network is managed independently. The IP layer configuration (VRF services) of all networks is independent and will even support same IP addresses in different networks. Each TDMA network can be active or inactive. Each SKYWAN 5G terminal can be assigned to multiple inactive networks.
paring inactive network configurations the operator is able to define new network configurations in advance and activate them later.

For interfacing to 3rd party management tools the northbound interface will be extended for network specific configuration and monitoring API. As such networks can be activated and deactivated by this machine-to-machine interface.

This NMS version is for networks running on R1.6. For compatibility reasons it supports to monitor and software upgrade active networks operating down to release R1.4.

**SNMP TRAP**

The Simple Network Management Protocol (SNMP) uses “traps” to report critical information from an “agent” (remote network device) to the “manager”, i.e. the Network Management System (NMS). The SKYWAN 5G agent sends SNMPv2 traps for the following conditions:

- high temperature
- fatal logs
- launcher process restarts
- fan status
- number of components changes (n+1, dvb, encryption)

The SKYWAN 5G NMS processes the received traps in the alarm center. The NMS generates itself SNMPv2 traps based on new alarms and sends it e.g. to an umbrella management system.

**SKYWAN 5G Licensed Features**

Recently added features are under license control, e.g., COTM, Pure Data Channels, Beam Switching, openAMIP/Antenna Control interface. For detailed commercial terms and conditions refer to the pricelist.